education and to kids and this was very uplifting' (Journal, September 2003).

Related to other aspects of situativity theory, throughout the doctoral research process and within the multiple communities of the academic, educational systems and schools, I was really grappling with a dominant professional identity. There was a strong sense of wanting to share my learning with others in these communities. Through engaging in research, preparing conference papers and presentations, writing for journals and practitioner publications and education consulting, I began to collaborate and to work towards making a difference for teacher and student learning.

With the goal of the formal doctoral qualification achieved, that process of collaborative professional learning and making a contribution is ongoing. No matter what the dominant pathway from here, it is certain to involve continued collaboration within multiple educational communities.

## References

Hargreaves, A. & Fullan, M. (1992). *Understanding teacher development*, London: Cassell.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*, New York: Cambridge University Press.

Van Manen, M. (1977). 'Linking ways of knowing with ways of being practical', *Curriculum Inquiry*, 6, pp. 205–228.

Wenger, E. (1998). 'Communities of practice. Learning as a social system', *Systems Thinker*, http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml

Australian Journal of Adult Learning
Volume 46, Number 1, April 2006

## RESEARCH REPORT

# An examination of the social systems of engineering projects

Errol Lawson
Systems Engineering and Evaluation Centre, and
Centre for Research in Education, Equity and Work
University of South Australia

My PhD thesis, titled "An examination of the social systems of engineering projects", was submitted in March 2005 and accepted by the University in August 2005. As can be inferred from the title, the research was transdisciplinary in that it drew from bodies of knowledge in domains of engineering, management, sociology, education and philosophy. My three supervisors were from both engineering (Systems Engineering and Evaluation Centre: SEEC) and education (Centre for Research in Education, Equity and Work: CREEW), and the examiners were from sociology and engineering.

The thesis drew together threads of the representation of real-world entities as systems, the life-cycle of groups of people, the nature of problem-solving and related issues associated the learning processes in the development and application of new knowledge in a group. These threads were consolidated in a Social Systems Evaluation Framework (SSEF) that was based on the forms of capital concepts of Bourdieu, namely embodied, social, institutionalised, economic and objectified capital. The Social Systems Evaluation Framework can facilitate the evaluation of the social system of an engineering project at any stage from initiation to disbandment and provides guidance on the encouragement of high performing teams or on the need for early intervention in a dysfunctional team by management.

A significant feature of successful projects is the complementary contributions of the formalised structure and processes and the informal relationship-based networks. These relate to the institutionalised and economic capital, and the embodied and social capital respectively. The former support the organisation and efficient performance of tasks that are predictable, routine and amenable to standardised procedures. The latter support the solution of problems that are novel and complex and require innovation and creativity. Leadership styles appropriate to a given situation, the recognition of experience in the formation of competence and expertise, and the criticality of collective learning, transactive memory and distributed intelligence are features of successful projects that are accessed at lower levels of the system comprising forms of capital.

Since completion of the research for the thesis, I have continued in two areas. The first is the representation of real-world entities, of which the hierarchical 'system' representation is the most familiar as it is found in entities as diverse as the family, religions, the military, bureaucratic and criminal organisations and the reductionist methods of natural science, medicine and engineering. The notion was that the common hierarchical representation, when applied to social



and socio-technical entities, does not allow for the interdependence and co-evolution of elements in generating emergent properties. Boundaries are artefacts of the representation, and limitation of analysis and intervention to elements within the chosen boundary, while necessary to simplify a problem to manageable proportions, can result in significant errors in developing measures for prediction and control.

The first results of this further research came in a refereed paper presented at the 2005 Systems Engineering, Test and Evaluation (SETE 2005) conference in Brisbane titled "The representation of systems". The conclusions of this paper are that the fully connected network is a more realistic representation of real-world entities and that the commonly used hierarchical representation can be derived from the network by eliminating, freezing or ignoring many of the available connections between elements or nodes. The network is considered to be the general case and therefore more useful as an area of research in understanding the behaviour of social and socio-technical systems.

The Defence Science and Technology Organisation (DSTO) has recently placed a research contract with the Systems Engineering and Evaluation Centre for a preliminary study on the characteristics of social systems that can be derived from the application of the network representation to the military.

The second area of further research is the life-cycle of small groups with particular reference to the formation of a group. The bodies of knowledge accessed previously suggested that an extended period of up to 18 months was necessary before an assembly of strangers could begin to function as a team. This was accepted at the time as indicative that some management care and attention is necessary in the selection and activation of a project team. However, in subsequent discussions with current managers/practitioners, it became evident

that management could not tolerate such a lengthy unproductive phase and their experience was that teams can 'gel' very quickly.

This study is ongoing and has lead to the work of psychologists in researching the ability of people to make seemingly accurate assessments of others in seconds rather than months and decide if they can work together. An aspect of this area of interpersonal relating is the Pygmalion effect – that is, that people respond to others in the way they are expected to.

I had an opportunity in late 2005 to test my approach to characterising projects as social systems when I delivered a one week course to students of the masters degree in project management from the Australian Department of Defence. These 15 students were at middle management level and were experienced project managers. They readily accepted my approach and, through many interactive discussions, I formed the view that they 'knew' much about what I was talking but it was tacit knowledge that only became explicit in discussions. Their difficulty in a highly structured and 'processified' organisation was to justify decisions and opinions made on the basis of that tacit knowledge. My role evolved towards providing them with information on the importance of tacit knowledge and making that knowledge explicit. Their final assignments were so informative that I have undertaken to publish them as an edited book.

A final comment is that my research program crosses several disciplinary boundaries. Transdisciplinary research is not easy for many reasons. Yet I believe that my research has demonstrated how necessary it is particularly at this stage of Western society when so many institutions are showing signs of distress. Remedies do not seem to be forthcoming from the 'stove-piped' domains and disciplines that evolved in the era following the Industrial Revolution.

~~Australian Journal of Adult Learning~~
~~Volume 46, Number 1, April 2006~~

## ~~RESEARCH REPORT~~

# ~~Organisational learning about depression in the workplace: a community of practice of silence and avoidance~~

~~Lisa Davies~~
~~Centre for Research in Education, Equity and Work~~
~~University of South Australia~~

~~The economic and social impact of depression on the Australian workforce (Hickie 2002; Hawthorne, Cheok, Goldney and Fisher 2003) is only recently being acknowledged. In 2004 I undertook semi-structured interviews with people with human resource responsibilities in the deregulated sector of information technology in South Australia. The interviews focused on their accessibility to work-based education about depression and asked their opinions regarding the merit of such education. As I also wanted to conceptualise~~ what is understood about depression and to seek insight into what their understandings are of prevailing attitudes in their workplaces